What is claimed is:

1. A method for sampling a high temperature process stream, comprising the steps of:

evacuating a low temperature zone of a sampling system using a vacuum pump;

admitting a portion of the high temperature process stream into the low temperature zone through an orifice;

maintaining a stable vacuum pressure in the low temperature zone; and

introducing a sample from the low temperature zone of the sampling system into test equipment through a sample introduction valve.

2. The method of claim 1, wherein the orifice has a diameter of between 0.005 inches and 0.025 inches.

3. The method of claim 1, wherein the step of maintaining a stable vacuum pressure in the low temperature zone includes metering flow to the vacuum pump.

4. The method of claim 1, wherein the step of maintaining a stable vacuum pressure in the low temperature zone includes controlling the vacuum pump.

5. The method of claim 1, wherein a temperature of the high temperature process stream is above a boiling point of a target sample component at the process stream pressure.

6. The method of claim 1, further comprising the step of maintaining a temperature of the low temperature zone above a boiling point of a target sample component at the stable vacuum pressure.

7. The method of claim 1, wherein the test equipment includes a mass spectrometer.

8. The method of claim 1, wherein the test equipment includes a FT-ICR mass spectrometer.

9. The method of claim 8, wherein the FT-ICR mass spectrometer includes a second vacuum pump, and the method further comprises the step of evacuating with the second vacuum pump a chamber of the FT-ICR to a pressure lower than the stable vacuum pressure in the low temperature zone.

10. The method of claim 1, wherein the stable vacuum pressure is between a pressure of the process stream and a high vacuum pressure of a vacuum chamber of the test equipment.

11. A sampling system for sampling a high temperature process stream to be tested in an analytical instrument, the sampling system comprising:

an evacuation system for maintaining a low temperature zone of the sampling system at a vacuum pressure;

a nozzle having an orifice connecting the sample stream with the low pressure zone of the sampling system; and

a sample introduction valve connecting the low temperature zone of the sampling system with a vacuum chamber of the analytical instrument, the sample introduction valve being located between the evacuation system and the nozzle.

12. The sampling system of claim 11, wherein the analytical instrument is a mass spectrometer.

13. The sampling system of claim 11, wherein the analytical instrument is an FT-ICR mass spectrometer.

14. The sampling system of claim 11, wherein the evacuation system comprises a vacuum pump.

15. The sampling system of claim 14, wherein the evacuation system further comprises a metering valve for metering an intake of the vacuum pump.

16. The sampling system of claim 11, wherein the orifice has a diameter of between 0.005 inches and 0.025 inches.

17. A method for sampling from a gaseous process stream at a process stream temperature and pressure, the stream having at least one component with a first boiling point lower than the process stream temperature when at the process stream pressure, the method comprising the steps of:

admitting a gas sample from the process stream through an orifice into a sampling system, the sampling system having a sampling system temperature lower than the first boiling point, the sampling system further having a sampling system pressure lower than

the process stream pressure, whereby the component in the gas sample has a second boiling point at the sampling system pressure, the second boiling point being lower than the sampling system temperature; and

introducing a portion of the gas sample into a test instrument chamber.

18. The method of claim 17, wherein the step of introducing the portion of the gas sample into the test instrument chamber includes pulsing a piezoelectric valve.

19. The method of claim 17, wherein the orifice is between 0.005 inches and 0.025 inches in diameter.

20. The method of claim 17, further comprising the step of maintaining a stable vacuum pressure in the sampling system.

21. The method of claim 20, wherein the step of maintaining a stable vacuum pressure in the sampling system includes regulating a vacuum pump throughput.

22. The method of claim 20, wherein the step of maintaining a stable vacuum pressure in the sampling system includes regulating a valve that meters flow through a vacuum pump.